REVOLUTIONIZING NIGERIA'S EDUCATION AND ECONOMY: LEVERAGING ON ARTIFICIAL INTELLIGENCE, INNOVATION AND CREATIVITY

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Introduction

Nigeria is Africa's most populous country with over 200 million population and one of its largest economies. With abundant natural resources, particularly oil and gas, alongside a large youthful population, Nigeria has enormous potentials to become a global economic powerhouse. Over the decades, the country has experienced cycles of growth and decline, largely tied to fluctuations in oil prices and political developments. While the economy has diversified modestly, it remains heavily dependent on oil revenues, making it vulnerable to external shocks. Despite being classified as a lower-middle-income country, Nigeria faces widespread poverty, unemployment, and infrastructural deficits (Business Day Newspaper, 2025).

Nigeria's systemic weaknesses, policy inconsistencies, and governance issues have hindered her sustainable growth. The education sector, which is critical for national development, suffers from chronic underfunding, dilapidated infrastructure, and frequent strikes cripple schools. Millions of children remain out of school especially in the north while those who graduate often lack the skills needed for today's job market. Brain drain worsens the crisis as top talent leaves for better opportunities abroad. Similarly, the economy, though rich in oil and gas, struggles with diversification, unemployment, and poverty. Both areas are deeply interconnected, as weaknesses in education directly affect economic productivity. A weak education system fuels unemployment, while a struggling economy limits investment in schools. The challenges in education and the economy are mutually reinforcing. An underfunded and inefficient education system produces graduates lacking critical skills, which in turn weakens the labor market and slows economic growth. Conversely, a struggling economy limits the government's ability to invest in quality education. This cycle traps millions of Nigerians in poverty and unemployment. Breaking this cycle requires bold reforms: funding education properly, equip youths with practical skills, diversify the economy beyond oil, and tackle corruption head-on.

Thus, Nigeria's future depends on turning its classrooms into engines of innovation and its economy into one that works for all. In this era, it is imperative to examine new paradigm shift in resolving these mutually reinforcing areas of national development and using modern techniques: artificial intelligence, innovation and creativity

It is true that Artificial Intelligence (AI), innovation and creativity have the potentials to close the gap between Nigeria's struggling education sector and its underperforming economy. By modernizing education through personalized learning and digital skills training, Nigeria can produce a workforce that matches the demands of an AI-driven economy. Applications of AI in agriculture, health, finance, and governance can create jobs and stimulate growth and

provide resources to reinvest in education. Also, creativity and innovation can jump-start the economy and bring new products to market the economy.

An Overview of Nigeria's Education System and Its Challenges

Education is a fundamental driver of national development, equipping citizens with the knowledge and skills to contribute meaningfully to society. In Nigeria, education is regarded as a basic human right and a key tool for achieving social mobility, economic growth, and technological advancement. Over the years, the Nigerian government has made efforts to expand access to education, but systemic weaknesses continue to undermine its quality and effectiveness.

Nigeria has operated different structures of educational system, at one point or the other, but now operates the 9-3-4 system. All these efforts have been to ensure that the educational system is put in proper perspective for national development. The objective of education in Nigeria is contained in the original National Policy on Education (NPE) document launched in 1977. According to Omotor (2004), the policy of education is geared towards self- realization, individual and national efficiency, and national unity aimed at achieving social, cultural, economic, scientific, and technological development. However, there are a lot of challenges to achieving these objectives including ensuring quality and inclusive education for all citizens. The challenges facing education in Nigeria are inexhaustible and the search for it is unlimited. Sometimes, old problems continue to be new problems as long as they remain unresolved. In fact, some of these problems continue to be chorus in our education song (Adejumo & Osalusi, 2021). These challenges include:

1. High cost of education: The cost of education in Nigeria is going on an alarming rate. Income of some parents could not enable their ward attain quality education or attend standard schools. Some that manage to finish from primary or secondary school could not further or acquire tertiary education.

2. Inadequate budgetary allocation/ under funding: Nigeria is one of the countries that is yet to allocate 26 percent of her budgetary allocation to education as recommended by the United Nations (UNESCO). This goes a long way to affect education in the country. One of the major problems facing Nigeria education is under funding.

3. Poor students' interest to teacher education: Most students are not willing to study education courses. Their orientation, interest and values toward teaching career are not encouraging. Sometimes they come to education faculties through frustration from other faculties. Then, what does the society expect from such teachers that can't offer what they do not have?

4. Inadequate and Irregular payment of teachers' salary: Often times, teachers in some states do not receive salary on time or as at when due. They are not regularly promoted on regular bases. This could affect the morale of teachers.

5. Teachers are not well supervised and monitored in some states: Where regular inspectors by inspectorate is lacking, some teachers may branch off into quick money-generating activities such as farming, butchering, petty-trading, etc. even during school hours (Nbina, 2007).

6. Poor Planning: A dearth of statistic on students' enrolment, number of teachers, their qualifications and demographic trends, statistics on buildings and other learning facilities are all inadequate at present. All these are capable of stalling planning.

7. Non-Utilization of Educational Research Finding: Result of educational research finding such as student work, conference papers and publications in learned journal are not sponsored and not and sometimes not utilized in Nigeria.

8. Value place on paper qualification: Many Nigerians have misplaced value on qualifications of candidates in the society. By so doing, some of the student resort to getting the certificate through various means and at all cost. Those that cannot burn their midnight candles may either take to examination malpractice or certificate forgery.

9. Flexibility of Nigerian system of education and curriculum: Education system and her curriculum continue to change from time to time and hardly can someone notice positive change. Abdulgafar and Edinyang (2013) aptly made this point clear when they opined that "the purpose of change is to improve the standard of living for the good of the common man".

10. Poorly equip libraries and laboratories: In most Nigerian schools, libraries and laboratories are not only ill-equipped but are grossing absent. In some schools, the Parent-Teachers Association (P.T.A.) and other voluntary bodies are directly involved in provision and equipment of public-school libraries and laboratories.

11. Poor teachers' welfare: Nigerian teachers are not motivated to produce their maximum productivity. They are not only poorly paid but fail to measure up with their counterpart in other areas. Perhaps, they are waiting for their reward in heaven as the society may say. Sometimes, teachers do not receive their regular promotions in addition to the poor salary they receive.

12. Poor management of education: Management of education in Nigeria at all levels may continue to suffer from ineffectiveness until policy prescriptions are passed as Act of the national assembly through the provision of legal backings. Sometimes, there exist educational conflict between the roles of federal, state and local government on the management of public schools.

13. Poor Parental Guidance: The parents are directly responsible for the provision of educational need of their wards. Parents are supposed to give proper guidance of the students at home but student that lack parental support for education will definitely be day-dreaming in the classroom or schools.

14. Population explosion on the part of the students: An increase in population over time and the continuous demand or pressure on education has led to over-crowded classrooms in some schools. Instead of the approved ratio of teacher to student (1:40) at secondary school level, a teacher may be teaching 100 students or above in a classroom.

15. Lack of dependable infrastructural facilities and amenities: Quite a good number of Nigerian schools in Nigeria lack facilities or equipment. This ranges from

students' learning in dilapidated building hostel, recreational centres, workshop etc to lack of instructional materials for teaching and learning.

16. Brain Drain (Japa Syndrome): Many talented academics and professionals migrate abroad for better opportunities, leaving gaps in Nigeria's educational and research systems. The professionals and good brains that are expected to work and improve the education sector and other sectors of the economy are making waves abroad.

17. Poor attitude of both teachers and students to the teaching and learning process: Teaching and learning ought to be a complementary process but sometimes, due to moral laxity the teacher may not be able to teach inspiringly to motivate the students to learn Such are capable of crippling the education sectors.

18. Politicization of education: Most attempts at educational reforms fail to succeed partly due to disparate political ideologies by leaders. Lack of continuity also exist from one administration to the other. In the area of accreditations, some schools that did not meet up the standard are allowed to operate too.

19. Insecurity and Safety Concerns: Insurgency, banditry, and kidnappings in many parts of Nigeria have forced schools to shut down. The abduction of schoolchildren has discouraged parents from sending their wards to school in high-risk areas hence jeopardizing the achievement of the objectives of education in the country.

The structure and challenges of the Nigerian economy

Nigeria is the largest economy in Africa and a key regional power, with vast natural resources, a large domestic market, and significant human capital. Despite its size and potential, the economy faces structural challenges that continue to limit inclusive and sustainable growth (Culican, 2024).

Nigeria also has an estimated 237 million people in 2025, making it the most populous country in Africa and the sixth most populous globally. This population has economy advantage: large labour force and large market. Population growth remains rapid, with an annual increase of about 2.5–2.7%. Approximately 55% of Nigerians live in urban areas, while the remainder reside in rural regions where agriculture dominates. The large and youthful population presents both opportunities (labor supply and market size) and challenges (job creation, education, and social services). Nigeria's GDP was estimated at US$1.49 trillion in 2024, with projections of US$1.56 trillion in 2025 following a recent rebasing exercise by the National Bureau of Statistics. This makes Nigeria the largest economy in Africa. Growth has been driven primarily by services (particularly ICT and trade), with modest contributions from agriculture. The oil sector, while volatile, is stabilizing as production gradually recovers. However, per capita GDP growth lags behind due to rapid population expansion, limiting improvements in living standards.

Inflation remains one of Nigeria's most pressing macroeconomic issues. Headline inflation closed at 34.8% in 2023, largely due to subsidy removals, exchange rate adjustments, and high food prices. By mid-2025, inflation had moderated but remained above 20%, reflecting persistent structural bottlenecks in food supply, exchange rate volatility, and high logistics costs.

Poverty remains widespread and multidimensional with unemployment at 23.1 % (2018) and 13% (2024) and over 90% of the Nigerians working in the informal sector of the economy (especially agriculture and petty trading). The World Bank (2023) estimated that 38.9% of Nigerians around 87 million people live below the national poverty line. The IMF put the poverty rate slightly higher, at around 42%. Poverty incidence is uneven across regions: it is concentrated in northern states and rural areas, where access to education, healthcare, and infrastructure is limited. High inflation, low job quality, and weak social services continue to exacerbate poverty.

Nigeria, Africa's largest economy by GDP and population, is endowed with abundant natural and human resources. However, despite its potential, the economy faces deep structural challenges that constrain growth, limit job creation, and perpetuate poverty. These challenges are multi-dimensional, cutting across macroeconomic management, structural bottlenecks, and social vulnerabilities.

1. Heavy Dependence on Oil
2. Inflation and Exchange Rate Instability
3. High Unemployment, Underemployment, and Informality
4. Widespread Poverty and Inequality
5. Infrastructure Deficits
6. Weak Public Finance and Revenue Mobilization
7. Governance and Institutional Weaknesses
8. Security Challenges

Impact of Problems in Education and the Economy on Nigeria's National Development

Adesola (2011) identified the following as some of the impact of the problems in education and the economy on Nigeria's national development:

1) Slower Long-Run Growth and Productivity
2) Persistent Unemployment, Underemployment, and Informality
3) Fiscal Fragility and Narrow Revenue Base
4) Entrenched Poverty and Inequality
5) Weakened State Capability and Governance Quality
6) Insecurity and Social Cohesion Strain
7) Brain Drain and Talent Pipeline Weakness
8) Competitiveness and Investment Headwinds
9) Digital Transformation Delays
10) Public Health and Human Development Setbacks
11) Urbanization Under Strain
12) Environmental Management and Climate Resilience Risks
13) Cultural and Civic Consequences
14) Education System Feedback Loops
15) Missed Demographic Dividend
16) International Standing and Regional Leadership

Artificial Intelligence in Education

Artificial Intelligence (AI) has emerged as a dynamic force capable of reshaping social interactions, particularly in education. AI refers to the development of computer systems capable of performing tasks that typically require human intelligence (Igbokwe, 2023). These tasks include learning, reasoning, problem solving,

perception and natural language understanding (Adelana & Akinyemi, 2021). Ogunode (2023) defined AI as programs designed with human-like intelligence and structured in forms of computer, robot, or other machines to aid in provision of any kind of service or tasks to improve social economic and political development of the society. Artificial Intelligence encompasses various techniques and approaches, such as machine learning, deep learning, natural language processing, computer vision and robotics. Olatunde- Aiyedun (2024) explained that these technologies enable computers to analyze vast amounts of data, recognize patterns, make predictions and automate complex processes. Fullan, et al., (2023) elucidated that Artificial Intelligence has applications across numerous fields, including health care, finance, transportation, customer service and education. It has the potential to transform industries, improve efficiency and create new opportunities (Igbokwe, 2023).

In the educational context, AI includes applications such as intelligent tutoring systems, predictive analytics, and automated administrative tools (Nwoye et al, 2024). Srinivasa, et al (2022) posited that the adoption of AI technologies in education seeks to enhance knowledge acquisition, leading to a surge in online learning. In Nigeria, Artificial intelligence has brought so many opportunities in areas of Education such as students' activities, lecture note, report and memo writing as well as project writing (Abayomi et al, 2021; Sanusi et al., 2022), security (Falode et al., 2021), Health (Muhammad et al.,2021; Anazodo et al., 2022). Nwoye, et al (2024) submitted that AI systems not only answer questions and solve problems but also devise plans and perform tasks requiring intelligence akin to that of humans. This means that AI can be leveraged in the planning and management of education in Nigeria. Mureşan (2023) noted that AI has revolutionized administrative processes, increasing productivity and capabilities. AI-driven bots can monitor prospective students, facilitate communication between institutions and applicants, guide them in selecting suitable courses, and assist them throughout the enrolment process (Sanusi et al, 2022). Furthermore, AI systems can manage and update student records, including grades and attendance, while also assisting in creating timetables based on available faculty, room slots, and class schedules (Arya, 2024). By automating these tasks, AI reduces the burden on administrative staff, enabling them to focus on more complex matters.

The Application of Artificial Intelligence in Education

Artificial Intelligence (AI) has moved from being a futuristic concept to a practical tool reshaping education globally. Ajuwon, Animashaun, and Chiekezie, (2024) advanced several reasons for AI's applications across teaching, learning, administration, and research. Such applications create new opportunities to enhance quality, access, and efficiency and ultimately revolutionize the education systems. These include:

1) Personalized and Adaptive Learning

AI systems analyze students' learning styles, pace, and performance to deliver customized lessons. For example: Adaptive platforms adjust the difficulty of exercises in real time based on learners' responses. Recommendation engines suggest additional resources, practice questions, or videos tailored to individual needs. This ensures that students struggling with a topic receive reinforcement while advanced learners are challenged appropriately.

2) Intelligent Tutoring Systems (ITS)
AI-powered tutoring platforms act like digital "private teachers": Provide step-by-step guidance in mathematics, science, or languages, offer instant feedback and hints, allowing learners to correct mistakes immediately and encourage self-directed learning outside the classroom by giving students 24/7 academic support.

3) Automated Grading and Assessment
AI can grade multiple-choice, fill-in-the-blank, and even short essay questions, saving teachers' time. It enables faster evaluation and timely feedback for students. In large classrooms or online courses (like MOOCs), AI ensures that assessments are scalable and consistent.

4) Virtual Classrooms and Learning Assistants
AI chatbots and voice assistants answer student questions, explain difficult concepts, and remind learners about deadlines. Virtual reality (VR) and AI-driven simulations allow students to explore subjects like history, medicine, or engineering in immersive ways. These tools make learning more interactive and engaging, especially for digital-native students.

5) Inclusive Education Support
AI supports learners with special needs by providing assistive technologies such as: Text-to-speech (TTS) for visually impaired students, Speech recognition for learners with writing difficulties, Real-time translation and captioning for language learners or hearing-impaired students. This ensures equal access and participation in learning.

6) Educational Administration and Management
AI simplifies school and university management by: Automating admissions, scheduling, and record-keeping, using predictive analytics to identify students at risk of dropping out or underperforming and helping policymakers allocate resources more efficiently based on data insights.

7) Research and Curriculum Development
AI helps educators analyze vast amounts of academic data to identify gaps in learning materials. It can simulate how changes in curriculum affect student performance before implementation. AI-driven research tools assist students and academics in finding relevant literature quickly and detecting plagiarism.

8) Lifelong and Global Learning
AI enables online platforms to reach learners beyond traditional classrooms, from primary school children to adult professionals. Through personalized recommendations, learners can continuously upgrade their skills in line with global labor market demands. AI fosters cross-border collaboration by connecting learners and teachers around the world.

Challenges and Limitations of Implementing Artificial Intelligence in Nigerian Education
Despite the promises that AI adoption holds for educational system in Nigeria, several challenges exist. Some of these include:

1. **Data privacy and security concerns:** One significant challenge is ensuring the protection of student information and compliance with regulations such as the General Data Protection Regulation (GDPR). This raises concerns about the security of data and the potential for breaches. Data protection regulations require that institutions implement robust security measures to protect against unauthorized access and misuse. Compliance with these regulations necessitates comprehensive data management practices, including encryption, secure storage solutions, and strict access controls to prevent data breaches (Igbokwe, et. al., 2024).
2. **Algorithmic bias:** One critical challenge in AI adoption is algorithmic bias, which occurs when AI systems produce skewed or unfair results due to biased training data. If AI tools are trained on data that reflect existing social inequalities, they may inadvertently reinforce discrimination in student assessments, admissions, and resource allocation. For instance, an AI-powered grading system trained on past academic records may unintentionally disadvantage students from underprivileged backgrounds.
3. **Resistance to change among educators and administrators:** Resistance to change among educators and administrators is another significant challenge in Nigeria in implementing AI and technology. Many educators may be skeptical of new technologies due to concerns about their effectiveness, the potential for increased workload, or fear of being replaced by machines. They may be insufficiently trained in using AI tools in the classroom, hindering their ability to effectively leverage new technology. Educators and administrators may not be familiar with the prompts and commands given to the systems (Arya, 2024).
4. **Infrastructural deficits:** Insufficient access to technology, including Personal Computers (PCs) and tablets, hinders the effective deployment of AI-driven educational tools. The inconsistent supply of electricity and inadequate internet access in numerous schools provide significant obstacles, impeding the effective utilization of AI apps and hampering student's educational advancement.
5. **Issue of inclusion and ease of accessibility:** This is because many individuals do not have equal access to technology which can create a disadvantageous position for such individuals. For example, many students in Nigeria do not have access to a smartphone or internet connection which can put them in a disadvantageous position compared to those who have such facilities. Besides the socio-economic status of students, geographical location and access to internet can also be a factor in access to AI-based education. This hinders the utilization of AI in educational planning and management of secondary schools in Nigeria (Awofiranye, 2024).
6. **Dehumanizing the learning experience:** A decreased dependence on teachers for instance, is a challenge since AI despite its capacity cannot replace the need for human teachers. The teacher's role is important not only for education but also for shaping the students' careers. Therefore, AI brings a challenge as a decreased dependence on teachers means a decreased focus on students' moral and personality development (Adlawan, 2024).
7. **Inability of students to explore their full potential:** This is because if students start depending too much on AI-based education, it will limit their critical abilities including thinking, logic, and memory which is a big drawback. In other words, students will be depending too much on machines which can hinder their learning and making full use of their potential (Awofiranye, 2024).

8. **Cost factor**: This is another challenge and cannot be ignored. Provision of the initial outlays for software and cloud support is very costly for educational systems. Again, the costs for continuous employee training are expensive.

Innovation and Creativity in Education

In the words of Hemati and Taheri (2022), innovation in education means introducing new ideas, methods, tools, or systems to improve how teaching and learning take place. It focuses on finding better, more effective, and often technology-driven solutions to challenges in education i.e. using artificial intelligence to personalize learning, introducing digital classrooms or e-learning platforms, designing new teaching strategies like flipped classrooms or gamified lessons, creating policies and curricula that meet modern demands (e.g., STEM education, coding in schools).

Creativity in education on the other hand refers to encouraging original thinking, imagination, and problem-solving skills among students and teachers. It's not just about arts; it's about fostering the ability to think outside the box, explore new solutions, and express unique ideas i.e. encouraging students to design their own projects or solutions to real-life problems, teaching in ways that spark curiosity and critical thinking rather than rote memorization and using storytelling, art, music, or design in lessons to deepen understanding (Almeida, Audretsch & Leite, 2024).

Importance of Innovation and Creativity in Education

Innovation and creativity are increasingly recognized as critical drivers of progress and quality improvement in education. Development and application of new ideas, methods, technologies, and pedagogical strategies that enhance teaching, learning, and educational management are the main focus in this 21st century (UNESCO, 2021). Creativity involves the ability to generate original ideas, while innovation emphasizes applying those ideas to solve real-world problems (Robinson, 2011). Together, they provide a foundation for transforming education systems to meet the demands of the 21st century.

Some of the importance of innovation and creativity are:

1. Enhancing Teaching and Learning

Innovation and creativity improve the quality of teaching and learning by encouraging more engaging, student-centered approaches. For example, the use of digital technologies, gamification, and project-based learning promotes active participation, critical thinking, and problem-solving skills (Anderson and Garrison, 2018). Creative approaches help cater to diverse learning styles, making education more inclusive and accessible.

2. Fostering 21st-Century Skills

The modern world demands skills such as collaboration, communication, critical thinking, and adaptability. By embedding innovation and creativity in education, students are better prepared for the complexities of a knowledge-driven economy (Trilling and Fadel, 2009). This shift moves education beyond rote memorization towards developing competencies necessary for lifelong learning and employability.

3. Promoting Educational Equity and Inclusion

Innovation drives the development of solutions to educational disparities. Creative approaches, such as low-cost technology interventions, distance learning, and open educational resources (OER), help bridge gaps between urban and rural schools and provide opportunities for marginalized groups (UNICEF, 2020).

4. Improving Problem-Solving and Real-World Application

Creativity and innovation encourage experiential learning, where students connect classroom knowledge to real-world challenges. This approach strengthens problem-solving skills and helps learners understand the relevance of education in addressing social, economic, and environmental issues (Fullan & Langworthy, 2014).

5. Driving Teacher Professional Development

Teachers benefit from innovation through exposure to new pedagogical practices and tools. Continuous professional development programs focused on creativity help teachers become facilitators of learning rather than mere knowledge transmitters, thereby improving educational quality (Darling-Hammond et al., 2017).

6. Strengthening National Competitiveness

Countries that prioritize innovation and creativity in education cultivate human capital that can compete globally. Knowledge economies rely heavily on innovative minds to develop industries, entrepreneurship, and technology solutions that drive national development (OECD, 2019). Education systems must therefore nurture creativity to remain competitive.

7. Supporting Sustainable Development

The United Nations' Sustainable Development Goal 4 (SDG 4) emphasizes inclusive and equitable quality education, which requires innovative solutions to ensure access and equity. Creative learning practices also foster global citizenship, sustainability awareness, and the ability to tackle future challenges (UNESCO, 2021).

Fostering Innovation and Creativity in Nigerian Education

Innovation and creativity are essential for transforming Nigeria's education sector, which faces challenges such as outdated curricula, inadequate infrastructure, poor teacher training, and low technological integration (Adejumo & Osalusi, 2021). To prepare students for a knowledge-driven economy and global competitiveness, Nigeria's education system must embrace strategies that promote creative thinking, technological adoption, and innovative practices. Below are key approaches to fostering innovation and creativity:

1. Curriculum Reform and Integration of 21st-Century Skills

To encourage creativity, the Nigerian education curriculum should prioritize critical thinking, problem-solving, digital literacy, entrepreneurship, and collaboration (Trilling and Fadel, 2009). Integrating project-based learning (PBL), design thinking, and STEAM (Science, Technology, Engineering, Arts, and Mathematics) education can provide students with practical skills relevant to the future of work. Such reforms align with the National Policy on Education's vision to produce globally competitive graduates (Federal Ministry of Education, 2020).

2. Teacher Training and Professional Development
Teachers are central to fostering innovation. Strengthening teacher capacity through continuous professional development programs, workshops, and exposure to innovative teaching strategies is vital (Darling-Hammond et al., 2017). Nigerian educators should be trained in student-centered methods, digital pedagogy, and creativity-enhancing techniques to create dynamic learning environments.

3. Leveraging Educational Technology
Integrating ICT tools, e-learning platforms, and digital resources can drive innovation in Nigerian schools. Tools such as virtual reality (VR), augmented reality (AR), gamification, and AI-based personalized learning can make education interactive and engaging (Anderson & Garrison, 2018). The government should expand access to affordable internet and provide digital infrastructure to bridge the digital divide, especially in rural areas.

4. Encouraging Research, Innovation Hubs, and Maker Spaces
Establishing innovation labs, maker spaces, and entrepreneurship hubs in schools and universities will allow students to experiment, innovate, and develop problem-solving skills. Nigerian tertiary institutions can partner with tech companies and international organizations to create innovation ecosystems that nurture creativity and research outputs (OECD, 2019).

5. Public-Private Partnerships (PPPs)
Collaboration between the government, private sector, and civil society organizations can promote innovative education models. For example, partnerships with tech firms, NGOs, and EdTech startups can provide funding, training, and technological solutions to improve the quality of teaching and learning in Nigeria (UNESCO, 2021).

6. Policy Reforms and Increased Funding
Government policies should prioritize education innovation by increasing funding for research and development (R&D), digital tools, teacher training, and curriculum modernization. Policies that encourage experimentation and innovation in schools will create an enabling environment for creative teaching and learning practices (Federal Ministry of Education, 2020).

7. Promoting a Culture of Creativity
Schools should encourage curiosity, collaboration, and problem-solving rather than rote memorization. Educators can introduce brainstorming sessions, arts and creativity clubs, debates, and interdisciplinary projects to cultivate creativity (Robinson, 2011). Emphasizing emotional intelligence, leadership skills, and creativity assessment in education will nurture a generation of innovators.

8. Community and Industry Engagement
Linking education to real-world problems by engaging communities and industries can drive innovation. Schools can organize innovation challenges, entrepreneurship fairs, and industry internships to expose students to practical experiences (Fullan & Langworthy, 2014).

Some Examples of Notable Education Innovations in Nigeria

1. KEY Academy – Project-Based Learning
2. EdoBEST & EKOEXCEL – Data-Driven Public Education Reform
3. Mavis Talking Books & Edo-BEST Digital Rollout
4. Landmark University, FUNAAB & Babcock University – Agri-Tech in Education
5. UNILAG's "Project Innovation to Market" (I2M)
6. W.TEC – Empowering Girls in Tech
8. University Research & Innovation Hubs

Leveraging AI, Innovation, and Creativity for Economic Growth

In dealing with this, we need to look critically into how AI, innovation and creativity can be used to change the narrative of the economy positively and enhance economic growth most especially in the major sectors of the economy.

Potential Applications of AI, Innovation, and Creativity in Nigerian Industries

Some of the Potential Applications of AI, Innovation, and Creativity in Nigerian Industries as identified by Arya, 2023 are:

1. Agriculture

AI-powered technologies including precision farming tools, drones, sensors, and predictive analytics are being used to monitor soil health, optimize fertilizer use, and detect crop diseases early, thus increasing yields and promoting sustainable practices (Rajagopal & Murugan, 2023).

2. Healthcare

AI tools are being developed for diagnostic assistance, such as analyzing medical images, expediting disease detection, and enhancing patient monitoring. Additionally, innovative systems like ADVISER a vaccination intervention optimizer use AI to maximize vaccination uptake by optimizing intervention allocations in Nigeria (Nair et al., 2022).

3. Finance and Fintech

AI in Nigeria's fintech sector supports fraud detection, credit scoring, and personalized advisory services. Examples include Kudi.ai (AI chatbots facilitating transactions), Lidya (AI-driven credit scoring), and broader automation of banking processes to improve efficiency and financial inclusion.

4. Education

The education sector benefits from AI through adaptive learning and personalized tutoring systems, automated grading, and intelligent content delivery platforms, which enhance learning and administrative efficiency.

5. Manufacturing and Industry

AI enhances the manufacturing sector by enabling real-time product quality control, predictive maintenance, and energy optimization. Studies show reductions in downtime by 30–40% and improved operational performance in pilot implementations (Guardian Nigeria; Amaugo, 2024).

6. Transportation and Logistics
AI applications in logistics include route optimization, real-time tracking, and supply chain efficiency crucial improvements in Nigeria's infrastructure-constrained environment.

7. Security, Government Services, and Customer Support
AI-powered systems are streamlining public services and customer interactions. Examples include facial recognition for security, chatbots for citizen engagement, and e-government services to improve efficiency and responsiveness.

8. Energy
AI contributes to energy management through smart grid optimization, predictive analytics for sustainable power distribution, and efficient off-grid electricity solutions enhancing reliability and reducing waste.

9. Creative Industries
Artists and content creators in Nigeria are leveraging AI for innovative outputs. Creative technologist Malik Afegbua used AI to produce "The Elder Series," reimagining elderly models in high-fashion runway scenarios—challenging stereotypes with artistic expression (Wikipedia 2023).

10. Language, Media, and Data Analytics
AI is also helping to preserve indigenous languages through tools like CDIAL's Indigenous, which offers speech recognition, translation, and chatbot support in local dialects. Moreover, Dataphyte leverages AI for data journalism transforming datasets into accessible insights for media, researchers, and policymakers (Wikipedia CDIAL, Wikipedia Dataphyte). Additionally, African Folder, the media platform, employs AI writers to scale content creation while maintaining cultural authenticity (Wikipedia, African Folder).

Benefits of AI-Driven Innovation for Economic Growth
Artificial Intelligence (AI)-driven innovation is emerging as a key catalyst for economic growth, transforming industries, driving productivity, and fostering entrepreneurship. By integrating machine learning, automation, data analytics, and creative problem-solving, AI accelerates the transition to knowledge-based economies, especially in developing nations like Nigeria (Bughin et al., 2018; Manyika et al., 2017).

1. Productivity Enhancement and Operational Efficiency
2. New Business Models and Entrepreneurship Opportunities
3. Economic Diversification and Job Creation
4. Boosting Innovation and Research Capacity
5. Enhancing Public Service Delivery and Governance
6. Agricultural Transformation for Food Security
7. Attracting Foreign Investment and Global Competitiveness
8. Inclusive Growth and Financial Inclusion

Examples of Successful AI-Driven Innovation Initiatives in Nigeria are:

1. Startups & Entrepreneurial Innovations

Africaam: An EdTech platform offering animated lessons, personalized dashboards, and exam preparation tools across core national exams. Africaam has earned accolades like the Digital Innovator of the Year (U.S. Chamber of Commerce, 2020) and support from the UNICEF Innovation Fund (2022).

GMini AI: Founded by Dr. Cho, GMini delivers a multilingual AI learning platform and has trained over 200,000 individuals in AI literacy through affiliated institutes.

2. Corporate & Institutional Initiatives

Access Bank: Utilizes AI, machine learning, and robotic process automation for services like facial biometric payments and mobile banking. These innovations have reduced fraud and enhanced customer engagement.

MTN Nigeria: Introduced Africa's first AI-powered chatbot for its MoMo mobile money service and leverages AI for network optimization, improving reliability and customer satisfaction.

3. Government & Innovation Hubs

3-Million Technical Talent (3MTT): Launched in 2023, this federal government program aims to train three million Nigerians in AI, ML, data science, and related skills by 2027, starting with 30,000 trainees across all states.

Ilorin Innovation Hub: A public–private tech centre established in 2023 and mentored by 2025, this hub offers incubation, accelerator, training in AI, AgriTech, energy innovation, and creative technologies targeting the creation of 1,000 jobs.

4. AI in Health Interventions

ADVISER (AI-Driven Vaccination Intervention Optimiser): Deployed in Oyo State, this optimization tool allocates vaccination resources to maximize uptake. In pilot trials, it reached over 13,000 families, demonstrating improved immunization coverage.

Suggestions

It is highly suggested that the government should adopt the following into the national policy to enhance effective deployment of AI innovation and creativity in the economy:

1. Draft and Implement a Comprehensive National AI Policy. The government should develop an all-encompassing National AI Strategy that provides direction for AI adoption across education, industry, and governance.
2. Integrate AI and Creativity into Education Curricula. Ensure that AI literacy, coding, computational thinking, and ethical awareness is embedded into education from early schooling through tertiary levels.
3. Invest in Digital Infrastructure and AI Research Capacity. Allocate sufficient funding for high-speed internet, computing infrastructure, AI labs, and research centers in universities and innovation hubs.
4. Strengthen Public–Private Partnerships (PPP). Foster collaborations between government agencies, universities, and tech industry players such as Google, Microsoft, and local fintech innovators for access to cloud infrastructure and

hardware donations, internship and training opportunities and real-world project co-development

5. Expand Skilling Programs and Teacher Development. Scale up initiatives such as 3MTT (Three Million Technical Talent) to train Nigerians in AI, data science, UX/UI design, cybersecurity, and related areas country-wide.
6. Promote Research, Innovation, and Creative Problem-Solving. Establish innovation hubs, AI hackathons, and creative studios within schools and universities to nurture student-led projects and cross-disciplinary collaboration.
7. Ensure Ethics, Data Protection and Responsible AI Governance: Strengthen and enforce frameworks like Nigeria Data Protection Regulation to safeguard privacy and build public trust.
8. Initiate and Implement Pilot Projects and Scale Best Practices for AI classrooms and localized AI education programs in select schools.

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